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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/714,644	11/18/2003	Akira Sakai	117787	2533

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EXAMINER	
DANG, TRUNG Q	

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/714,644	SAKAI ET AL.	
	Examiner	Art Unit	
	Trung Dang	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-15 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-15 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, and 8-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Fitzgerald et al. (U.S. Pat. 6,039,803).

The reference teaches a method for fabricating a SiGe film comprising the steps of:

forming a relaxed graded film 14 of SiGe over a Si substrate 12 (Fig. 1A and col. 5, lines 25-35);

forming 90 degrees dislocations at the interface region of said SiGe film and the Si substrate (Fig. 11B illustrates hexagonal network of dislocations at the interface region).

Noted that, column 13, lines 2-5 discloses "an orthogonal dislocation grid made up of dislocations of the kind 1/2<110> and 1/2<$\bar{1}$10>, reactions such as equations (1) and (2) can lead to the hexagonal network". That is, according to the equation (1) and (2), array of 60° dislocations is evolved to form array of orthogonal (90°) dislocations that make up the orthogonal network.

For claims 2-4, since the SiGe film 14 is consisting of graded $Si_{1-x}Ge_x$ layers (x ranging from 0-1), each layer of the graded layer with a particular composition of Si and Ge is considered as an interfacial or intermediate layer as claimed.

As for the structure claims 8-11, the method of the reference as noted above produces a structure as claimed.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 5 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fitzgerald et al. as above.

Fitzgerald teaches a method and a structure as noted above. Fitzgerald differs from the claims in not setting the thickness of the interfacial layer within a range as claimed. However, it is well settle that, absent a showing of criticality by applicant, the determination of the interfacial thickness within the claimed range would have been obvious to one of ordinary skill in the art since it has been held that, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation. In re Boesch, 617 F_2d 272, 205 USPQ 215 (CCPA 1980); In re Sola 25 USPQ 433 (CCPA); In re Waite 77 USPQ 586 (CCPA).

5. Claims 6, 7, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fitzgerald et al. as above in view of Takasaki (U.S. Pat. 5,188,778).

Fitzgerald teaches a method and a structure as noted above. Fitzgerald differs from the claims in not disclosing a GaAs as an interfacial layer formed between the Si substrate and the SiGe layer. However, Takasaki teaches that the lattice constant of GaAs and Ge (or SiGe) are close to each other, hence defects are rarely generated at the interface between the two layers (col. 2, lines 35-39 and lines 48-49). Thus, the formation of a GaAs layer between the Si substrate 12 and the SiGe layer 14 would have been obvious to one of ordinary skill in the art because one skilled in the art would reasonably expected to achieve the same result for the reason that the lattice constant of GaAs and SiGe are close to each other.

For claims 7 and 14, the determination of the thickness of the GaAs layer as claimed would have been obvious to one skilled in the art for the same reason noted above.

6. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fitzgerald et al. as above in view of Mizushima et al. (U.S. Pat. 6,525,338).

Fitzgerald teaches a structure comprises the relaxed SiGe film 14 containing 90° dislocation on the Si substrate as described above. Fitzgerald differs from the claim in not disclosing a Si film formed on thereon.

Mizushima teaches a semiconductor device in which a strained silicon layer 4 formed on a relaxed SiGe buffer layer 2 is used for the channel of the device.

It would have been obvious to one of ordinary skill in the art to form a silicon layer on the relaxed SiGe layer 14 to obtain the device structure of Mizushima because the silicon layer when form on the relaxed SiGe layer will have tensile strain and therefore enhance the carrier mobility in the channel region, hence improve the performance of the device.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Trung Dang whose telephone number is 571-272-1857. The examiner can normally be reached on Mon-Friday 9:30am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Trung Dang
Primary Examiner
Art Unit 2823

09/17/04